Description

The RCA WV-519A is one of RCA's complete line of high-quality, general-purpose volt-ohm-milliammeters. The instrument measures DC voltages from 5 mV to 1200V; AC voltage (RMS) from 0.1 to 1200V; DC current from 5 uA to 6A; resistance from 1 ohm to 100 megohms, and decibels from −20 to +57 dB. The sensitivity of the instrument is 50,000 ohms-per-volt for DC measurements, and 10,000 ohms-per-volt for AC measurements.

Protection diodes are included in the WV-519A to prevent damage to the meter movement due to accidental overload. Precision resistors are used in all measurement functions to insure accuracy.

A convenient polarity switch permits measurement of negative DC voltages without reversing the test lead connections.

The WV-519A is attractively styled with a dark blue case, three-color aluminum panel, and large, three-color meter with a mirror scale. This versatile instrument can be used in many servicing and industrial applications, and is well suited for use in school workshops and laboratories. The instrument is supplied complete with test leads and batteries.

Specifications

DC Voltage

Ranges	0 to 0.3V, 3V, 12V, 60V, 120V, 300V, 600V, and 1200V
Input Resistance	50,000 ohms-per-volt
Accuracy	±3% (full-scale)

AC Voltage

Ranges	0 to 6V, 30V, 120V, 300V, 600V, and 1200V
Input Resistance	10,000 ohms-per-volt*
Accuracy	±4% (full-scale)
Frequency response (6V range)	10 Hz to 100 kHz, ±1 dB

DC Current

Ranges	0 to .03 MA, 6 MA, 60 MA, 300 MA, and 6 A
Accuracy	±3% (full-scale)

*Input resistance on 0.3V range is 33,000 ohms-per-volt.

Resistance

Ranges	R x 1, R x 100, R x 1 K, R x 10 K (measures 1 ohm to 100 megohms)
Accuracy	±3% of scale length
Batteries	two 1.5V penlite cells (RCA VS034A, VS334A, or equivalent) one 22.5V "photoflash" battery (RCA VS084, or equivalent)

Decibels

AC Range

6V	−20 to +17 dB
30V	+15 to +31 dB
120V	+27 to +43 dB
300V	+35 to +51 dB
600V	+41 to +57 dB
Accuracy	±4% (full-scale)

Size and Weight (approx.)

Dimensions	6⅜ inches x 4¼ inches x 1⅞ inches
Weight (net)	1 lb., 8 oz.

Operation

Caution

Before making any measurement always check to be sure that the switch is set to the proper function and range. When measuring voltage or current, it is good practice to make a trial measurement on a range higher than the voltage expected. Although the meter movement is protected against burn-out under ordinary overloads, continued or repeated overloads may impair the accuracy of the meter.

Inadvertent use of the resistance ranges when connecting test leads to a voltage source may burn out one of the internal resistors. For safety, it is recommended that all power to the test circuit be turned off while connecting or disconnecting the test leads. When measuring high AC or DC voltages, do not touch the instrument or the test leads.

Zero-setting

The meter pointer should indicate "0" when the instrument is not in use. If necessary, adjust the small panel screw at the bottom-center of the meter to zero the pointer.

Meter Scales

The WV-519A meter scales are functionally designed and color-coded to provide quick readability. All resistance measurements are read on the green ohms scale at the top of the meter. All DC voltage and current measurements are read on the two black "DC/AC" scales. All AC voltages above 6 volts are also read on the black DC/AC scales. A separate red "LO AC" scale is provided for measuring AC voltages below 6 volts. Decibel measurements are indicated on the two dB scales at the bottom of the meter.

DC Voltage Measurement

1. Plug the black test lead into the "−COM" jack and the red test lead into the "+" jack. (Plug the red test lead into the "+1200V DC" jack if that range is to be used.)
2. Set the slide switch left to "+DC", unless negative DC voltages are to be measured. Set the selector switch to a "DC V" range higher than the voltage to be measured.
3. Connect the black test lead to the ground or common of the circuit under test. Connect the red test probe to the voltage test point. Note: To measure negative voltages, set the slide switch to "−DC".
4. If necessary, reset the selector switch to a lower range to obtain a suitable meter reading.
5. Read the voltage on the black "DC/AC" scale. Use the scale numbers that correspond to the range in use, as noted below:

DC V Range	Use Scale Numbers	Multiple Reading By
0.3V	0 to 3	0.1
3V	0 to 3	1
12V	0 to 12	1
60V	0 to 6	10
120V	0 to 12	10
300V	0 to 3	100
600V	0 to 6	100
1200V*	0 to 12	100

*Plug test lead into "1200V DC" jack.
NOTE: This instrument can measure up to 30,000 volts DC using the WG-297 High-Voltage Probe and WG-441A Multiplier Resistor. Use the 300V range. Multiply reading by 100.

AC Voltage Measurements

1. Plug the black test lead into the "—COM" jack, and the red test lead into the "+" jack. (Plug the red test lead into the "1200V AC" jack if that range is to be used.)
2. Set the slide switch to the left "AC" position. Set the selector switch to an AC V range higher than the voltage to be measured.
3. Connect the black test lead to the ground or common of the circuit under test. Connect the red test probe to the voltage test point.
4. If necessary, reset the selector switch to a lower range to obtain a suitable meter reading.
5. If the "6V" AC range is used, read the voltage on the red "LO AC" scale. Read AC voltages above 6 volts on the black "DC/AC" scale. Use the series of scale numbers that correspond to the range in use, as noted below:

AC V Range	Use Scale	Multiply Reading By
6V	0 to 6 (LO AC)	1
30V	0 to 3	10
120V	0 to 12	10
300V	0 to 3	100
600V	0 to 6	100
1200V*	0 to 12	100

*Plug red test lead into "1200V AC" jack.

AF Output Measurement

The "AF" jack on the WV-519A is for use in measuring AF output signals such as the output of an audio amplifier. This jack has a capacitor in series with the measuring circuit to block any DC component that may be present. For output measurement, plug the red test lead into the "AF" jack, then follow the instructions for measuring AC voltage or decibels. Note: The capacitor in the AF measuring circuit may have some effect on the low frequency response of the signal.

Decibel Measurement

The dB scales are marked in DBM values. This value is defined as the number of decibels above or below a reference level of 1 milliwatt across a 600 ohm load. Zero DBM therefore indicates a power level of 1 milliwatt; 10 dbm, 10 milliwatts; and 20 dbm, 100 milliwatts, etc.

When relative dB measurements are made across other loads, the actual numerical values are of no significance. However, the figures are helpful as a reference in determining the number of dB units between two readings on the dB scale. For example, if one reading is 20 dB and a second reading is 14 dB, this would indicate a power level variation of −6dB, regardless of the resistive load.

1. Plug the black test lead into the "−COM" jack. Plug the red test lead into the "+" jack, or into the "AF" jack if an "AF" output signal is to be measured.

2. Set the slide switch to the left "AC V" position. Set the selector switch to an appropriate "AC V" position. Read decibel level on one of the two dB scales, as noted below:

   (If an AC V range above "30V" is used, refer to chart at bottom left of meter.)

AC V Range	Read From Scale	Add to Reading
6V	−20 to +17 dB	———
30V	+15 to +31 dB	———
120V	+15 to +31 dB	12 dB
300V	+15 to +31 dB	20 dB
600V	+15 to +31 dB	26 dB

DC Current Measurement

1. Plug the black test lead into the "−COM" jack and the red test lead into the "+12A" jack (if that range is to be used).

2. Remove power from the circuit under test.

3. Set the slide switch left to the "+DC" position, unless current with negative polarity is to be measured. Set the selector switch to an "MA" position higher than the current to be measured.

4. Connect the test leads in series with the test circuit. If necessary, open the circuit at a convenient point by disconnecting a wire or lead. Connect the black test lead to the negative side of the circuit and the red test probe to the positive side.

5. Apply power to the test circuit. Read current on the black "DC/AC" scale. Use the scale numbers that correspond to the range in use, as noted below:

Range	Use DC Scale	Multiply Reading By
0.03 MA	0 to 3	.01
6 MA	0 to 6	1
60 MA	0 to 6	10
300 MA	0 to 3	100
12 A*	0 to 12	1

Note:

1 amp (1A) = 1000 milliamperes (1000 MA)

1 milliampere (1 MA) = 1000 microamperes (1000 uA)

For example: 300 MA = 0.3 A
60 uA = .06 MA

*Plug red test lead into "12A" jack.

Resistance Measurement

Note: When measuring resistance, the internal batteries are used to supply voltage to the test circuit. The heaviest battery drain occurs when shorting the test leads together for zero adjustment, and when measuring resistance on the R x 1 range. For longest battery life, make zero adjustment and low ohms measurements as quickly as possible.

Important: Always remove power from circuit when measuring resistance.

1. Plug the black test lead into the "—COM" jack, and the red test lead into the "+" jack.

2. Set the selector switch to the appropriate ohms range, as noted below:

Resistance	Use Range
1000 Ω or less	R x 1
1000 Ω to 100k Ω	R x 100
100k Ω to 1 megohm	R x 1K
Above 1 megohm	R x 10K

Note: "K" means times 1000, thus 1k ohm is 1000 ohms. "MEG" or "M" means times 1,000,000, thus 1 megohm is 1,000,000 ohms.

3. Connect the two test leads together. Adjust the "Ω ADJ" control so that the meter pointer indicates full-scale "0" on the ohms scale.
4. Connect the test leads across the resistance to be measured.
5. Read the resistance on the green ohms scale. Multiply scale reading as indicated by the switch position that is used. (R x 1, R x 100, R x 1K, R x 10K.)

Checking Capacitors

The R x 10k range permits some indication of capacitor leakage resistance. A good paper or mica capacitor under 1 uf will indicate near infinity after the initial surge required to charge the capacitor is completed. Leakage is indicated if the resistance is less than infinity, the capacitor probably has defective insulation. The time required to charge the capacitor will vary with the capacity. The greater the capacity, the more the pointer will swing and the longer it will take for it to return to infinity. If the capacitor is shorted, the pointer will not return to infinity. If the capacitor is open, there will be no initial pointer deflection. Very small capacitors will indicate only a slight deflection and a rapid return to infinity. Electrolytic capacitors, however, normally indicate some leakage, after charging. The amount of leakage is generally related to the capacitance and voltage rating. For example, a low voltage, high capacitance unit will indicate more leakage (lower resistance) than a high-voltage, low capacitance unit. When testing an electrolytic capacitor, connect the red lead to the positive and the black lead to the negative terminal of the capacitor.

Checking Forward and Reverse Resistance of Semiconductor Devices

A basic test for most semiconductor diodes and other discreet semiconductor devices can be made as follows. Measure the resistance in one direction, then reverse the test lead connections to measure the resistance in the other

direction. If the device is good, the resistance in one direction will be much higher than the resistance in the other direction. The reverse resistance of most silicon diodes and other semiconductors devices will be near infinity. Germanium semiconductors will have significantly lower resistance as compared to the silicon types.

Maintenance

The RCA WV-519A normally requires no maintenance other than occasional battery replacement. If it should become necessary to replace any of the component parts, replacements can be ordered, by stock number, from your local RCA Parts and Accessories Distributor. Refer to the Replacement Parts List for stock numbers.

Battery Test

The need for battery replacement is indicated when the instrument cannot be set to full-scale zero on the ohms ranges. If it is not possible to zero on the R x 1 range, or if the pointer drifts slowly downscale, replace the two 1.5 volt penlite batteries (RCA VS034A, or equivalent). If it is not possible to zero or if there is pointer drift on the R x 10K position, replace the 22.5 volt battery. Note: The batteries are used for the ohms function only, and have no effect on voltage and current measurement.

Battery Replacement

To replace batteries, remove the case by taking out the two screws on the back. Insert new batteries observing the polarity as marked on the battery holder. Use two 1.5 volt penlite cells, RCA VS034A, VS334 or equivalent, and one 22.5 volt photoflash battery, RCA VS084, or equivalent.

Calibration

Normally, the internal adjustment requires recalibration only if the meter movement or other major components are replaced. This procedure specifies the use of a precision source of 120 volts AC.

If this voltage source is not available, the instrument can be calibrated at other voltage levels, however calibration should be made at or near full-scale deflection on one of the ranges.

The meter pointer should read exactly "0" when the instrument is not in use. If not, adjust the plastic screw at the bottom-center of the meter front.

1. Set the slide switch left to the "ACV" position. Set the selector switch to the 120 volt AC position.
2. Connect the test leads from the "—COM" and "+" jacks to a precision 120 volt AC source.
3. Adjust R-28 (located on circuit board, just behind the ohms adjust control) so that the meter indicates 120 volts (full-scale deflection).

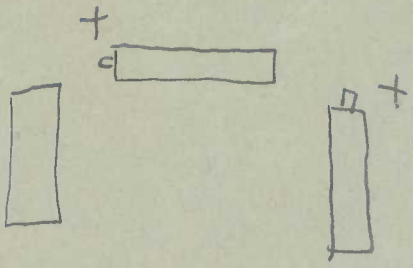
RCA Repair Service

Authorized RCA Service Depots throughout the United States are available for repair and calibration of RCA Electronic Instruments. For up-to-date listings of these depots, contact your RCA Distributor, or write to RCA Electronic Instruments, 415 South Fifth Street, Harrison, New Jersey 07029. If it becomes necessary to service this equipment, fill out the Test Equipment Service order form supplied with the instrument.

Follow these instructions:

1. Pack the test equipment carefully. The instrument should be double-packed. It is best to pack the unit in its original carton, or similar container, then "float" this carton in at least a 3-inch layer of suitable packing, such as shredded paper, inside the outer carton.
2. A full description of the problem should be included in the request.
3. Include all probes, cables, and test leads used with the equipment.

Attention to these details will help prevent damage in transit and delay in repairs.



Replacement Parts List

Order replacement parts by stock number through a local RCA parts and accessories distributor.

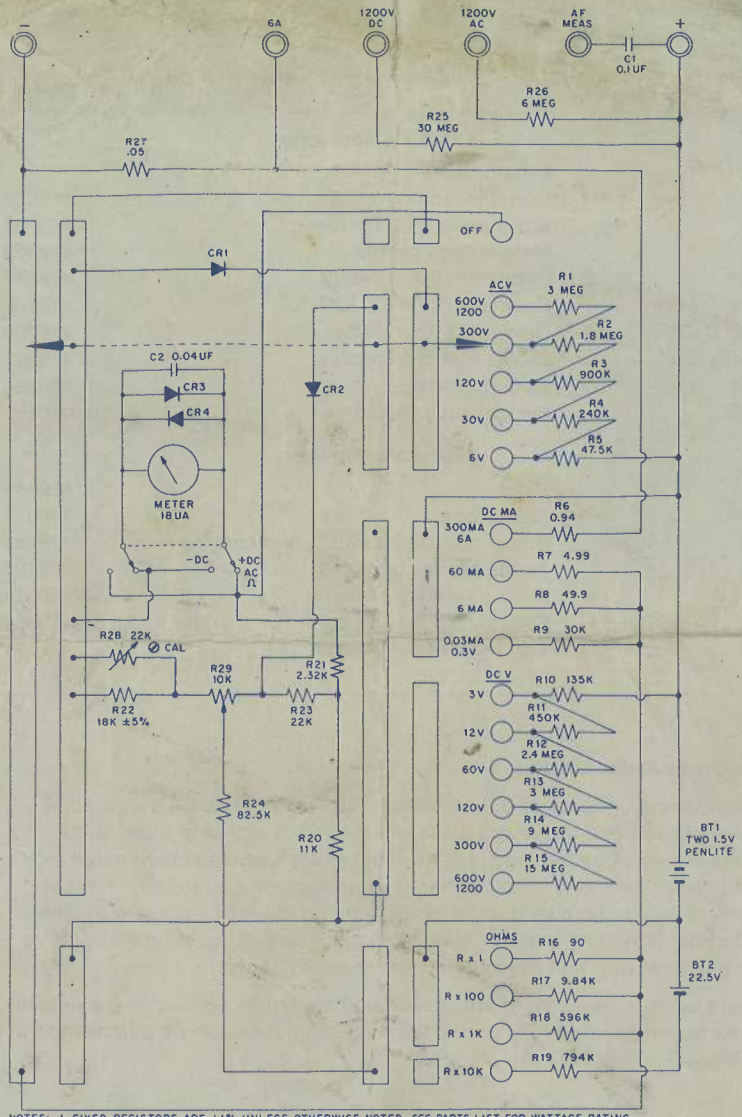
Symbol	Description	Stock No.
	Resistors	
	All resistors ±1%, ¼ watt unless noted	
R1	3 meg, ½ watt	419354
R2	1.8 meg, ½ watt	419355
R3	900k	419361
R4	240k	419360
R5	47.5k	419359
R6	0.94, ½ watt	419377
R7	4.99, ½ watt	419326
R8	49.9	419327
R9	30k	419374
R10	135k	419363
R11	450k	419275
R12	2.4 meg, ½ watt	419365
R13	3 meg, ½ watt	419354
R14	9 meg, ½ watt	410358
R15	15 meg, ½ watt	419357
R16	90 ohms	419366
R17	9.84k	419367
R18	596k	419368
R19	794k	419369
R20	11k	419371
R21	2.32k	419370
R22	18k, ±5%	419373
R23	22k	419364
R24	82.5k	419372
R25	30 meg, ½ watt	419356
R26	6 meg, ½ watt	419353
R27	.050 ohms (current shunt wire)	419378
R28	Variable, 22k, "CAL"	419622
R29	Variable, 10k, "OHMS ADJ"	419343

Symbol	Description	Stock No.
	Other Components	
M1	Meter, 20 uA, complete with scale plate and plastic cover	419379
	Scale plate only, for meter	419386
	Meter cover, plastic	419383
C1	Capacitor, 0.1 uF, 400V	419315
C2	Capacitor, 0.04 uF, 50V	419285
CR1, CR2	Diode, AC sig. rectifier	419286
CR3, CR4	Diode, meter protection	419287
S1	Switch, range	419387
S2	Switch, slide (polarity)	419388
	Miscellaneous Parts	
	Panel	419380
	Case, back	419381
	Board, circuit, for switch and components	419382
	Terminals, for batteries	419292
	Knob, for range switch	419384
	Knob, for ohms adj. control	419385
	Test lead, red	221711
	Test lead, black	221712

Anti-Static Meter Coating

The clear meter cover of this instrument has been coated with a special anti-static solution to prevent static effects on the action of the pointer. Eventually this coating may lose its effectiveness, and a static charge will build up on the meter case causing the pointer to act erratically. You can check this anti-static characteristic by rubbing the meter cover with a clean soft cloth. If the anti-static coating is no longer effective, the meter pointer will move off zero and remain there for several minutes.

If necessary, a new coat of anti-static solution can be applied to the outside of the meter "window." A small bottle of this solution can be purchased from most local electronics distributors.



NOTES: 1. FIXED RESISTORS ARE ±1% UNLESS OTHERWISE NOTED. SEE PARTS LIST FOR WATTAGE RATING
2. ⊘ INDICATES INTERNAL ADJUSTMENT.

WV-519A Schematic Diagram